YUKON RIVER JOINT TECHNICAL COMMITTEE REPORT

prepared by:

The Joint Canada/ United States
Yukon River Technical Committee

February 25-26, 1998

Anchorage, Alaska.

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1.0 INTRODUCTION

The Yukon River Joint Technical Committee (JTC) met at the Alaska Department of Fish and Game (ADF&G) office in Anchorage on 25-26 February, 1998. The purpose of the meeting was to address agenda items tasked to the JTC by both the Yukon River Panel, and the chief negotiators for the Canadian and United States delegations involved in the Yukon River salmon treaty negotiations. This report addresses the agenda assigned by the Yukon River Panel in November 1997, in preparation for the Yukon River Panel meeting scheduled for 9-12 March, 1998 in Teslin, Yukon. A separate report will be prepared for the Yukon River salmon treaty negotiations scheduled for 23-27 March, 1998. The agenda assigned by the Yukon River Panel was as follows:

1. 1998 preseason salmon run outlooks.
2. Discuss preseason fishery management planning.
3. Summarize the R&E Fund proposal technical review process for the 1997/98 review cycle.
4. Develop a working definition of "artificial propagation" for the Panel to consider.
5. Other business?

This report is organised into five subsequent sections which correspond with the above-noted agenda topics. One "other business" item, the Rampart mark-recapture and radio tagging project, was discussed.

A core group participated throughout the meeting, while some additional people attended only during the discussion of specific agenda items. Attendees during the Panel-assigned agenda discussions on 25 February were as follows:

Alaska Department of Fish and Game
Larry Buklis (co-chair)
Elizabeth Andrews
Louis Barton
Jeff Bromaghin
Rich Cannon
Russ Holder
Tracy Lingnau
Keith Schultz

Fisheries and Oceans Canada (DFO)
Sandy Johnston (co-chair)
Ian Boyce

U.S. Fish and Wildlife Service (USFWS)
Steve Klosiewski
Monty Millard
David Wiswar

National Marine Fisheries Service (NMFS)
John Eiler
Richard Wilmot

Tanana Chiefs Conference (TCC)
Kevin VanHatten

2.0 1998 YUKON RIVER SALMON RUN OUTLOOKS

2.1 ALASKA

2.1.1 Chinook Salmon

Typically, the majority of the chinook salmon returning to the Yukon River are 6-year-old fish; however, 5- and 7-year-old fish make a significant contribution to the run. Spawning ground escapements in 1992, the brood year producing 6-year-old fish returning in 1998, were judged to be average to above average in magnitude. However, the return of this brood year as 5-year-old fish in 1997 appeared to be below average. The 7-year-old return is expected to be strong based upon the high contribution of age-6 fish in the 1997 run. The return of 5-year-old fish in 1998 is expected to be average to above average in abundance based on the spawning escapements observed in 1993. Overall, the 1998 chinook salmon run is anticipated to be near average in strength. The commercial harvest in Alaska is expected to be 88,000 to 108,000 chinook salmon (82,000 to 100,000 fish in the Lower Yukon Area and 6,000 to 8,000 fish in the Upper Yukon Area).

2.1.2 Summer Chum Salmon

The return of 5-year-old fish in 1998 is expected to be below average based on spawning escapements observed in 1993 and the contribution of 4-year-old fish in the 1997 run. An above average return of 4-year-old summer chum salmon is expected. Summer chum salmon spawning escapement to the Anvik River in 1994 was 1,125,000, more than double the minimum escapement goal of 500,000 fish. Escapements to other spawning areas in 1994 appeared to be above average based upon weir counts for the East Fork Andreafsky River and Gisasa River, and tower counts on the Nulato, Chena and Salcha Rivers and Kaltag and Clear Creeks. Overall, the 1998 outlook is for an average to above average summer chum salmon run. The commercial harvest is expected to be 500,000 to 800,000 fish, but given the uncertainties associated with run distribution and market conditions, it may be less.

2.1.3 Fall Chum Salmon

Drainage-wide fall chum salmon escapements for the period 1974 through 1991 have been estimated by ADF&G to have ranged from approximately 110,000 (1982) to 1,200,000 (1975), based upon expansion of escapement assessments for selected stocks to approximate overall escapement abundance. Escapements in these years resulted in subsequent returns which ranged in size from approximately 301,000 (1988 production) to 1,400,000 (1975 production) fish, using

the same approach to approximating overall escapement. Corresponding return per spawner rates ranged from 1.1 to 4.5. The average return per spawner for all years combined was 2.5.

A Ricker spawner-recruit model was used by ADF&G to predict the returns of fall chum salmon from the 1992 to 1995 parent years that will contribute to the 1998 run. This process resulted in a projection of approximately 880,000 fish with the following estimated age composition:

Age-3 fish	16,000	(1995 Brood Year)
Age-4 fish	649,000	(1994 Brood Year)
Age-5 fish	201,000	(1993 Brood Year)
Age-6 fish	14,000	(1992 Brood Year)

A run of 880,000 fall chum salmon is greater than the overall average run size estimated for the 24-year period 1974 through 1997 (785,000), and well above the average return estimated for even-numbered years (629,000). The expected major contributor to the 1998 run will be from the 1994 brood year. In that year, excellent fall chum salmon escapements were realized throughout the drainage with all escapement goals being achieved in both Alaska and Canada; the first time on record.

The current management plan, adopted by the Alaska Board of Fisheries in December 1997, directs that only when the fall chum salmon run is projected to be more than 675,000 fish, can the department consider a directed Yukon River fall chum salmon commercial fishery. Should the 1998 fall chum salmon run materialize as projected, the run size would be sufficient to not only meet escapement, subsistence and border passage objectives, but also provide for Alaskan commercial opportunity.

2.1.4 Coho Salmon

Although comprehensive escapement information on Yukon River coho salmon is lacking, it is known that coho salmon have later and overlapping run timing with fall chum salmon, and primarily return as age-4 fish. Assuming average survival, a very strong return of coho salmon is likely to materialize in 1998. This is based upon results of surveys conducted in selected portions of the Tanana River in 1994. While coho salmon escapements were considered average to above average in all areas examined, more than 60,000 were counted in the Delta Clearwater River alone, the highest on record and well in excess of the minimum escapement goal of 9,000 for this river.

Currently, there are no Alaska Board of Fisheries established guideline harvest ranges for Yukon River coho salmon, and this species is managed as incidental catch during the fall chum salmon directed fishery. Thus, any commercial harvest of coho salmon in 1998 will be largely a function of fall chum salmon abundance and associated management strategies to harvest that species.

2.2 CANADA

2.2.1 Chinook Salmon

The expected total run size of Canadian origin, upper Yukon[1] chinook salmon for 1998 is approximately 143,000 fish. In comparison, the upper Yukon chinook run size averaged approximately 140,000 fish during the six year cycle from 1990 to 1995[2]. Qualitatively, the 1998 run is therefore expected to be **average** in magnitude. The 1998 run outlook is based on escapement data for 1991 through 1993, and calculated returns per spawner for the individual brood year escapements based on the spawner-recruitment relationship for the 1977 to 1988 brood years.

The interim escapement goal range for rebuilt upper Yukon chinook (excluding the Porcupine) is 33,000 to 43,000 chinook. The Panel has agreed that, as part of a chinook salmon rebuilding plan, the escapement goal for the period 1996 through 2001 is 28,000 chinook salmon. With the exception of 1993, spawning escapements in the principal brood years of the 1998 run were below both of these targets.

The spawner-recruitment relationship is the same as that used in developing the 1996 expectation. This is due to the fact that the brood table data used for the development of the 1997 expectation, including the 1996 run size estimate, is under review. The spawner-recruitment relationship developed in 1996, and used in developing the 1998 run expectation, was derived using age compositions from Canadian spawning escapements and commercial harvests. When data was not available for individual years, averages were substituted. The age compositions of Canadian commercial harvests were applied to the harvests of Canadian origin chinook in the U.S.. Escapements for 1977 and 1978 were estimated by expanding a cumulative four-area escapement index (Tatchun Creek, Big Salmon R., Nisutlin R., and the non-hatchery returns to the Whitehorse Fishway) by the average proportion the index represented of the total escapement estimates (derived from DFO mark-recapture studies in 1982-83, and 1985-89). Escapements for 1979-81 and 1984 were estimated in a similar manner except that a five area index, which included the four-area index streams plus the Wolf River index counts, was used. Mark-recapture results were used to estimate the escapement in 1982, 1983 and 1985 through 1997.

The total return from each brood year escapement was estimated by apportioning the total annual run sizes in the principal return years by the average age composition. It is estimated that, on average, the majority of chinook return at six years of age (63%), with significant numbers returning at age seven (20%) and age five (13%). Annual run sizes were reconstructed using ADF&G scale pattern data and DFO tagging results.

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[1] The upper Yukon River, for the purpose of this report, is defined as the Yukon River drainage in Canada, not including the Porcupine River drainage.

[2] Total harvest in 1997, is not available for chinook salmon at time of printing. Also, the scale pattern analysis (SPA) for 1996, used in the estimation of the U.S catch of Canadian origin chinook salmon, is under review. Therefore, accurate run size estimates for 1996 and 1997 are not currently available. The cycle average ending in 1995 is used for comparison purposes for the upper Yukon chinook salmon expectation.

The relationship between the natural logarithm of the return per spawner (R/S) and number of spawners (S) for the 1977 to 1988 brood years is described as follows:

$$\mathbf{Ln(R/S)=2.617-0.0346(S);} \qquad [1]$$

where: S = # spawners (in thousands),
R = returns.

The correlation coefficient (r^2) of this regression is 0.78 and the relationship is significant ($p<0.005$).
Based on equation [1] and the average age composition, the estimated returns from the principal brood years in 1998 are as follows:

Brood Year	Esc.	Calc'd Ln(R/S)	Calc'd R/S	Est'd prod'n	1998 Return
1991	20,743	1.899	6.681	138,587	27,717
1992	25,382	1.739	5.690	144,434	90,993
1993	28,558	1.629	5.098	145,595	18,927
sub-total (accounts for 96% of the return)					137,637
Total Expected Run Size in 1998 (rounded)					**143,000**

These calculations do not factor in the number of females in the brood year spawning escapements. Limited information on the quality of escapement exists for the years in question. At the Whitehorse Rapids Fishway, females comprised 42%, 52% and 44% of the escapement in 1991, 1992, and 1993 respectively. Other data which may provide some indication of escapement sex ratios were obtained from the DFO fishwheels situated just upstream of the Canada/U.S. border. The proportion of females in the catch for the principal brood years of the 1998 return were below average. However, it is possible that water levels and/or an abundance of age-four fish, for which the fishwheels appear to be selective, may have biased the fishwheel catches towards males.

2.2.2 Fall Chum Salmon

It is estimated that, on average, 62% of upper Yukon adult chum salmon return at four years of age and 35% return at five years of age. This suggests that the major portion of the 1998 fall chum run should originate from the escapement of 98,358 chum salmon in 1994, which was close to the 1993-1996 cycle average of 102,000 fish. Additional returns can be expected from the 1993 escapement of 29,743 chum, which was a record low escapement. The escapement goal for rebuilt upper Yukon chum salmon is >80,000 fish; a rebuilding program for upper Yukon chum is

currently scheduled to be completed by 2001. The 1993-1996 cycle average is 28% above the rebuilding goal; however, it should be noted that the recent cycle average is significantly greater than the long term average.

The productivity rate of 2.5 R/S is used in the joint Canada/U.S. upper Yukon chum salmon rebuilding model and has been used in recent years by DFO for developing run expectations. However, productivity rates of drainage wide Yukon fall chum index stocks for the 1991 and 1992 brood years appear to exceed 3.0 R/S. Given this, plus the fact that a record low escapement to the upper Yukon was observed in 1993 (productivity tends to increase in years of low spawning escapement), a productivity rate of 3.0 R/S is used to forecast the return from the 1993 brood year. Note that a rate of 3.5 was used for this brood year in developing the 1997 expectation. However, the estimated return of age four fish to the Yukon River in 1997, indicates that this R/S estimate (3.5) may be slightly high. For the return from the 1994 brood year, it is considered appropriate to use a projection of 2.5 R/S, since the escapement was much higher than that observed in 1993. The expectation using these productivity rates is for a run size of 190,000 chum salmon in 1998.

Although there are insufficient stock identification data for Yukon chum salmon from which to accurately estimate annual run sizes, assumptions have been made to allow the 1998 outlook to be expressed in terms of the average estimated run size. Run size estimates for previous years were developed based on the following DFO assumptions:

a) 30% to 50% of the U.S. catch of fall chum is composed of Canadian origin fish;
b) the U.S. harvests Canadian stocks in the same ratio as: upper Yukon border escapement-to-Porcupine border escapement; and,
c) the Porcupine border escapement consists of the Old Crow catch plus the Fishing Branch escapement.

Using these assumptions, the recent four-year cycle average (1993-1996[3]) total return of upper Yukon Canadian-origin chum salmon is estimated to have been in the range of 175,000 to 205,000 fish. In comparison, the expectation of 190,000 upper Yukon chum salmon for 1998 is **average**.

The chum salmon run to the Canadian portions of the Porcupine drainage in 1998 should originate primarily from the 1994 escapement. The escapement to the Fishing Branch in 1994 was 65,247 chum salmon (weir count). This is above the 1993 -1996 cycle average of about 55,800 fish and within the lower end of the interim escapement goal range of 50,000 to 120,000 chum for the Fishing Branch River. Additional returns can be expected from the escapement of 28,707 chum, observed in 1993.

The productivity of the upper Porcupine River chum stocks appears to be lower than that of both the drainage wide stock aggregate and the upper Yukon stock aggregate, particularly when averaged over the brood years 1988 to 1991. (The return from the 1992 brood year can not be estimated at this time, since age analysis of samples collected at the Fishing Branch weir in 1997 has not yet been completed). Rather than use the drainage wide return per spawner estimates, DFO

[3] Total harvest in 1997 is not available for fall chum salmon at time of printing. Therefore, run size estimates for 1997 are not currently available. The cycle average ending in 1996 is used for comparison purposes for the fall chum salmon expectations.

has prepared a stock-recruitment brood table using the assumptions listed above. The average productivity over the years 1982-1991 is estimated to be 2.2 returns per spawner[4], and this is used to develop the 1998 forecast. Assuming a return per spawner of 2.2, and using the average age at return of 60% age four and 36% age five, a return of 112,000 is expected in 1998. The Canadian-origin Porcupine chum stock size is estimated to have averaged 78,000 to 91,000 fish over the 1993-1996 four-year cycle (based on the assumptions previously described). The 1998 expectation by DFO is therefore for an **above average** run size. However, this expectation may be somewhat optimistic in light of the poor escapement observed at the Fishing Branch River weir in 1997 (27,000 chum), which may be evidence of below average production from the 1993 brood year.

3.0 PRESEASON FISHERY MANAGEMENT PLANNING

Management plans for 1998 Yukon River fisheries are still in the developmental stage and as such, the following should be viewed as very preliminary information. Final plans will not be drafted until public review processes in each country have been completed, likely by May in Alaska, and by the end of May or early June in Canada.

3.1 1998 Alaska Management Plan

Throughout the Alaskan portion of the Yukon River drainage, commercial fisheries management will be focused on conservation and subsistence priorities. Management plans for the 1998 Yukon River salmon fisheries in Alaska are still being developed; it is anticipated that final plans will be completed by May. The final plans will be forwarded to DFO in Whitehorse for distribution in Canada at that time.

Management of the chinook and summer chum salmon runs is complex because of the overlapping run timing of these species. Inseason assessment of test fishing, commercial, and subsistence harvest reports, sonar passage estimates at Pilot Station, and age composition information will be used to assess salmon run abundance and timing. Escapements will be monitored inseason in the East Fork Andreafsky, Anvik, Kaltag, Nulato, Gisasa, and South Fork Koyukuk Rivers and Clear Creek. Nenana test fish wheel catches, Chena and Salcha River tower counts, and aerial surveys will be utilized to manage the District 6 fishery.

Based on the preseason outlook, it is projected that the midpoint of the chinook and summer chum salmon guideline harvest ranges will be targeted in 1998. An effort will be made to spread the chinook salmon harvest out over the run, so that no one segment is over exploited. It is anticipated that the directed commercial chinook salmon fishery in the lower river will open by emergency order when increasing subsistence and/or test-net catches have occurred over a 7 to

[4] This R/S was calculated using the assumptions presented above for the run size estimates, but assuming that 30% of the U.S. catch of fall chum is composed of Canadian origin fish.

10 day period. The harvest of chinook salmon in unrestricted mesh size openings in Districts 1 and 2 will be closely monitored. Typically, fishing periods with unrestricted mesh size gillnets target larger chinook salmon, which results in a higher harvest of females that are important for spawning success.

The Alaska Board of Fisheries amended the Yukon River Fall Chum Salmon Management Plan during a December 1997 meeting in Fairbanks. The amendment increased the level of fall chum salmon needed prior to consideration of a commercial fishery from 600,000 to 675,000 fish. When the most current management plan is applied to the 1998 preseason projection of 880,000 fall chum salmon, a commercial harvest approaching the third quartile of each district's or subdistrict's guideline harvest range is anticipated. The combined third quartile of all districts' or subdistricts' guideline harvest range is 258,563 fall chum salmon. However, based on inseason run strength information, the actual commercial harvest may be adjusted upwards or downwards.

Currently, a coho salmon management plan has not been adopted for the Yukon River. At the December 1997 Alaska Board of Fisheries meeting, the Board deferred action on Proposal 273. This proposal was submitted by the Yukon River Drainage Fisheries Association (YRDFA) and requested the Board to adopt a coho salmon management plan for the Yukon River. However, during the December 1997 meeting, YRDFA requested additional time to develop a consensus within its members. The Board tabled Proposal 273 to provide additional time for stakeholders to discuss this issue. The YRDFA addressed a coho salmon management plan at its February 1998 annual meeting in Kaltag and approved a Yukon River coho salmon management plan. This plan will be forwarded to the Board for action during the November 1998 meeting. The YRDFA proposed management plan would allow for directed coho salmon commercial fisheries only in years that meet unique fall chum and coho salmon run strength requirements. However, for the 1998 fishing season, any commercial harvest of coho salmon would occur incidental to the fall chum salmon directed fishery.

3.2 1998 Canadian Management Plan

The 1998 Canadian management plan for Yukon River fisheries is in the developmental stage and will be finalised following the Yukon salmon negotiations 23-27 March, 1998 and meetings with fishers and the Yukon Salmon Committee in May or June. The foundation of the management plan is expected to be escapement objectives of 28,000 upper Yukon chinook salmon, >80,000 upper Yukon chum salmon and 50,000-120,000 upper Porcupine chum salmon. The overall Canadian upper Yukon guideline harvest ranges have not yet been established for 1998 since the Interim Yukon River Salmon Agreement is currently scheduled to terminate 31 March, 1998 and replacement or extension arrangements have yet to be negotiated.

4.0 STATUS OF THE JTC TECHNICAL REVIEW OF RESTORATION AND ENHANCEMENT FUND PROPOSALS

4.1 1998 R&E Review Process

The JTC R&E Subcommittee was given 37 proposals to review on 3 November, 1997. The Subcommittee met the week of 3 November in Whitehorse and determined Subcommittee lead reviewers for each proposal. Recommendations were made for secondary reviewers. In addition to the actual proposal and the technical review form which was sent to secondary reviewers, a cover letter and a summary of the review process was attached to help secondary reviewers understand the context and process in which their reviews would be received. Secondary reviewers were requested to complete their reviews by early January and forward their review to the primary reviewer. Secondary reviewers per proposal ranged from 1 to 5 with an average of 2.5.

The secondary reviews were consolidated by the primary reviewer into a draft JTC R&E Subcommittee Technical Review Form prior to meeting as a subcommittee the first week of February. The Subcommittee met in Fairbanks the week of 2 February, 1998 to finalize the technical evaluations and recommendations for each proposal. The reviewers found that most of the proposals were incomplete and lacked the level of technical detail expected of a scientific proposal. The Subcommittee discovered that many proposals contained unclear or inappropriate objectives or were unfocused in their approach. Even though many of the proposals were incomplete, lacked critical information, or were too broad in scope, the Subcommittee did assess that portions of many of the proposals had technical merit but needed additional development. The Subcommittee identified those proposals which were technically acceptable, those which were unacceptable, and those which needed revision. The Subcommittee requested the Executive Secretary to provide all the proponents a copy of the Subcommittee's technical evaluation during the public comment period to allow them an opportunity to comment on the technical evaluation assessment. Proponents whose proposals required revisions to become technically acceptable were provided a deadline of 26 February, 1998 to submit their revisions to the Executive Secretary. In addition, one technical person was identified as a contact to assist the proponent in revising their proposal.

The Subcommittee discussed several ways for improving both the focus and level of technical detail of submitted proposals. Suggestions included development of a list of prioritized projects for proponents to consult, development of a "cookbook" for standardized assessment or restoration techniques, and/or adoption of a proposal format which required a proponent to submit a preproposal which could be evaluated and assessed as to the portions which merited development into an actual proposal.

5.0 DEVELOPMENT OF A WORKING DEFINITION OF "ARTIFICIAL PROPAGATION"

The JTC R&E Subcommittee presented a draft working definition of artificial propagation, developed during a meeting held on 2-5 February, 1998. The JTC approved the working definition for consideration by the Yukon River Panel. The definition is as follows: "Artificial propagation is the human assisted fertilization of fish eggs."

6.0 DISCUSSION OF OTHER BUSINESS

Under the "other business" agenda item, the JTC briefly discussed the Rampart mark-recapture and radio-tagging project. Tentative plans for 1998 call for a mark-recapture program similar in magnitude to the programs conducted in 1996 and 1997. An expanded radio telemetry program is anticipated. Additional remote tracking stations will be placed on the Chandalar River, Sheenjek River, Black River, lower Porcupine River, and the Yukon River mainstem near Circle, Alaska. If funds become available, tracking stations will also be installed adjacent to two chum salmon spawner enumeration index areas in Canada.

The development of an automated database-GIS (geographical information system) mapping program to process and summarize telemetry information was also discussed. An Internet link and associated educational program is being developed to assist in disseminating information to agencies and communities. The GIS component will provide a framework for archiving and summarizing information collected on salmon in the drainage.